A STUDY OF THE EDUCATIONAL GROWTH OF 4-H FOOD PRESERVATION CLUB MEMBERS - MASSACHUSETTS, 1939*

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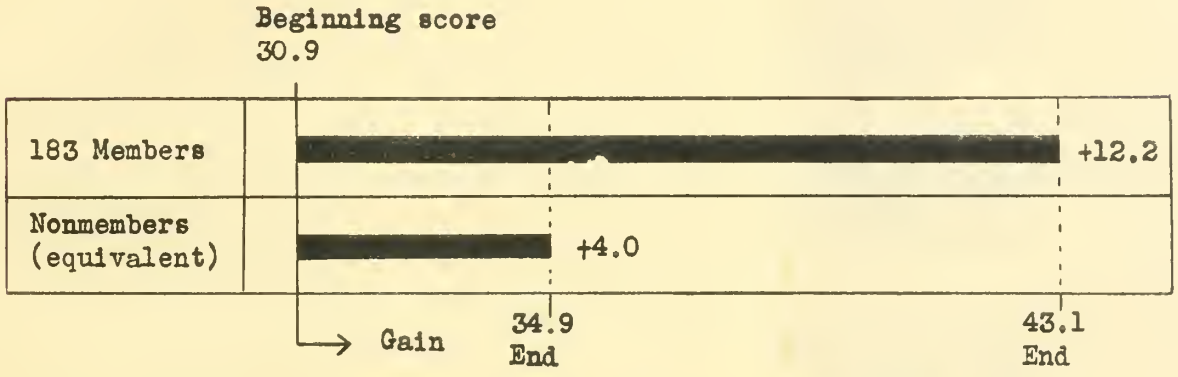
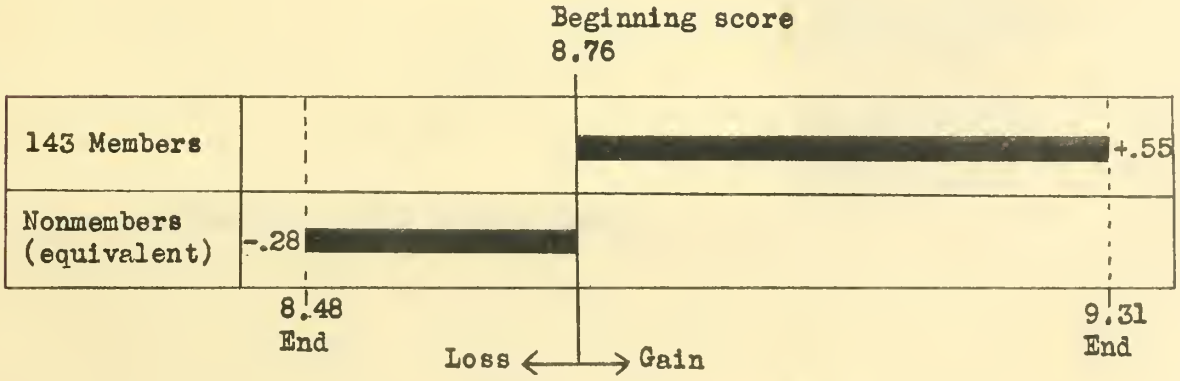


Growth in Food Preservation Knowledge



Growth in Self-Confidence

*Second in the Series of Evaluation Studies in 4-H Club Work

United States Department of Agriculture

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ACKNOWLEDGEMENTS

This study is the second of a series of studies of the values of 4-H Club work to the boys and girls who participate, which was sponsored by the Land-Grant College Committee on the Influence of 4-H Club Work, under the chairmanship of Director R. J. Baldwin of Michigan.

The authors wish to express their appreciation of the cooperation and assistance of the 4-H Club girls, nonmembers, local leaders, school authorities, Federal and State specialists, and members of the Federal Extension 4-H Club Studies Committee (1940).*

The help of Professor W. R. Cole, State horticultural specialist in preparing the food-preservation test, and of Frances D. Andrews, assistant club agent in Franklin County, Mrs. Sylvia W. Cummings, assistant club agent in Hampshire County, Mrs. Mary D. Hall, assistant club agent in Hampden County, and Miss Adeline Fein, supervisor of canning and gardening in Chicopee in arranging meetings and in conducting the study contributed to its success.

The interest and encouragement of Director Willard A. Munson and State 4-H Leader George L. Farley of Massachusetts have been very helpful in initiating and carrying the study to completion.

* Federal Extension 4-H Club Studies Committee (1940). Members - C. E. Potter, Gertrude L. Warren, Ray A. Turner, Madge J. Reese, E. H. Shinn, Fred P. Frutchey, and Barnard Joy, chairman.

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SUMMARY OF THE STUDY

Purpose

The purpose of the study was to determine the degree to which five 4-H educational objectives were being reached by the girls who participate in the 4-H food-preservation projects and to compare their growth with girls who did not and never had participated.

Method

The study was conducted in Franklin, Hampden, and Hampshire Counties, Mass., in 1939. The 4-H Club work was carried on in the usual manner with an average of one or two meetings per month for a period of 5 months and with most of the learning experiences provided through the incentive of having a project. Subject matter was discussed at club meetings; demonstrations of canning were observed; and the members participated in canning and were given food-preservation bulletins for home study and reference.

Tests were constructed in cooperation with interested individuals for each of the five objectives and were given to 183 4-H food-preservation club members who completed their project, to 30 members who did not complete, and to a check group of 216 girls who had never had a 4-H food-preservation project. The tests were given at the beginning of the project period in May and again 5 months later in October at the end of the period.

Findings

4-H MEMBERS LEARNED FOOD-PRESERVATION KNOWLEDGE

In food-preservation knowledge the members gained considerably more than the check group of nonmembers. Their gain was three times as much as that of the nonmembers. In view of the length of the project period (5 months) and the conditions of conducting 4-H Club work, the proportionate growth of the members to the nonmembers was marked achievement.

DISTRIBUTION: A copy of this circular has been sent to each State extension director; State leader and assistant State leader in county agricultural, home demonstration, and 4-H Club work; extension editor; vegetable garden and nutrition specialist; agricultural-college library; and experiment-station library.

4-H MEMBERS DEVELOPED SELF-CONFIDENCE

The difference between the "before and after" tests showed that the members who completed their projects developed self-confidence in their ability to can food products. The check group of nonmembers lost self-confidence. Participating in the 4-H food-preservation project helped the girls to rely upon their own abilities in canning.

INCOMPLETE MEMBERS LOST SELF-CONFIDENCE

Interestingly enough, members who did not complete their project lost self-confidence in their ability to can food products. Members who completed gained in confidence. The difference suggests that 4-H Club leaders in general should give serious consideration to the effect on the all-round development of the individual girl when the question of completion arises. If a girl fails to complete, care should be taken that the girl does not get a sense of failure.

INCOMPLETE MEMBERS LEARNED FOOD-PRESERVATION KNOWLEDGE

Although the members who did not complete their project gained in food-preservation knowledge, they did not gain as much as the members who completed.

KNOWLEDGE INCREASED WITH EXPERIENCE

The members who completed their project gained in food-preservation knowledge as their experience in canning increased. The girls who canned the greatest number of jars learned the most about food preservation.

CONFIDENCE INCREASED WITH EXPERIENCE

The members developed self-confidence as their experience in canning increased. The more the girls canned, the more the girls relied upon their own abilities in canning.

STANDARDS OF COMPLETION VERSUS PERSONALITY DEVELOPMENT

The last four findings should be interpreted in the light of each other. Although they show that the more the girls canned the more food-preservation knowledge they learned and the more confident they became in their ability to can, it does not necessarily follow that higher standards of completion should be set. It was also found that the members who did not complete their project lost self-confidence in contrast to those who completed, and yet, they did learn about food preservation although not as much as the members who completed. Raising standards of completion may result in more incompletions, and more incompletions may result in greater ill effects upon the personality development of the girls. Concern for the growth and development of the individual girl should be given first consideration. Quantitative material standards should receive secondary consideration and should be adapted to the first and most important concern of 4-H Club work.

FOOD ATTITUDE, FOOD HABITS, AND HEALTH

There was scarcely any difference in gain between the members and equivalent nonmembers in food attitude. The slight difference was in favor of the nonmembers. The slight difference in gain between the members and equivalent nonmembers in food habits was also in favor of the nonmembers. Neither of these differences was statistically significant and each could easily have been due to chance fluctuations involved in sampling.

Since these two objectives are particularly appropriate health objectives for food-preservation projects, the results indicated that special efforts should be made to provide educational experiences in the 4-H program to bring about desirable growth in the objectives. The 4-H Club food-preservation bulletins could be revised or a special bulletin prepared presenting information emphasizing the importance of fruits and vegetables in the diet, that foods contain vitamins, the need of a proper distribution of vitamins in maintaining health, and the poor health conditions which may develop from lack of necessary foods. Health information could be discussed at local leader training meetings.

MEMBERS MAINTAINED DESIRE TO CONTINUE IN SCHOOL

Since younger girls had a greater desire to continue in school than older girls, a decrease in desire to continue in school was expected. The members however did not decrease. They remained about the same at the end of the project period as they were at the beginning, while the equivalent group of nonmembers decreased as was expected. Hence, it appeared that the difference between the two groups can reasonably be attributed to a maintaining influence of 4-H Club work in contrast to an improving influence.

MEMBERS CONTRIBUTED TO FAMILY LIVING

The members contributed canned food products to the family winter food supply. The girls canned 58.0 jars on the average. They contributed to family living by helping their mothers with canning. Ninety percent of the girls, whose mothers canned, helped their mothers or someone with canning. Half of the girls helped more than 4.7 times during the summer.

MEMBERS APPRECIATED 4-H CANNING EXPERIENCE

The members appreciated their canning work. Ninety percent wanted more experience in a 4-H food-preservation club. They wanted to reenroll next year. Eighty-seven percent felt they got so much out of their 4-H canning work they wanted to recommend it to other girls of their age. Eighty-nine percent felt their canning work was worth "much" or "very much" to them.

In their opinion the three major values of the work to them was "learned to help their mothers with canning," "actually canned and learned how," and "obtained a lot of fun and satisfaction from the work." The chief dissatisfaction the girls felt was the lack of more time to can.

MEASURABLE INFLUENCES

The evaluation instruments developed were sufficiently sensitive to detect educational changes occurring in the participants in the relatively short period of 5 months and under the informal conditions of 4-H Club work.

THE 4-H CLUB FOOD PRESERVATION PROJECT IN MASSACHUSETTS

The food-preservation project offers an opportunity to young people to learn the art of canning foods for home use, and through this knowledge and ability to contribute to the family health and income, particularly during the winter months.

Enrollment

In 1939, 1,301 girls were enrolled in the food-preservation projects in Massachusetts. Of this number 744, or 57.2 percent, were enrolled in the 3 counties of Franklin, Hampden, and Hampshire included in this study. Over one-sixth of the total enrollment in 4-H Club projects in these 3 counties was in food preservation.

Learning Experiences

Members of the food-preservation project enrolled in the spring and completed their projects in the fall. They engaged in a variety of informal learning experiences during this period. They canned food products, attended 4-H Club meetings, kept a record of canning done, and exhibited some products at a community exhibit.

The girls organized themselves in clubs and selected a local leader from the community who was interested in young people and in food preservation. She was a homemaker, a teacher, or an older 4-H Club girl. The local leaders received help on giving instruction through training meetings, home visits, and demonstrations by the food-preservation specialist from the State college.

Meetings were usually held once in 2 weeks during the early part of the season and once a week later on when the products were ready for canning. The members met in the home kitchen of the local leader, the school laboratory, and in some instances, in the kitchen of a church or Grange hall. One group did most of its canning on an outdoor fireplace located in the backyard of the local leader's home. Instruction was given to the members through demonstrations and actual participation by the members. The ideas and skills were carried home and put into practice in the home kitchens of the members. The girls were also given instruction and practice in judging canned products. Part of the meetings was devoted to the business of the club, music, and recreation.

Members and leaders were provided with bulletins and leaflets on food preservation prepared for them at the Massachusetts State

College. In addition leaders and older girls obtained bulletins prepared especially for adults.

Judging contests were conducted at local and State fairs where ribbons were awarded. In some instances camp trips and cash were awarded.

The county club agent visited each organized club twice during the summer, at which time she helped the club members and local leaders with educational and organizational information.

The majority of the members lived in small communities and on farms. They came from homes of average incomes. A small percentage lived in thickly populated areas and found it necessary to buy their fresh produce for home canning.

The learning opportunities provided at 4-H Club meetings and events, the experience in actually canning their own foods, and the informal exchange of ideas and attitudes occurring when groups meet together were intended to bring about desirable educational changes on the part of the members participating. The variety of influences, direct and indirect, which the 4-H Club program encouraged, may bring about growth in many educational directions. These are the objectives or outcomes of the program. In the present study five objectives were identified and methods for measuring them were devised.

Educational Objectives

The instruction in food preservation subject matter and the experience in canning food products should result in an increased knowledge about food-preservation information. Carrying on a project which involves the actual canning of food products and the admiration of other people for those products may increase the members' self-confidence in their ability to can foods. Desirable shifts in health attitudes toward the effect on health of fruits and vegetables in the diet and improved health practices as to the amount of fruits and vegetables eaten may result from their work in food preservation. Encouragement received in 4-H Club work, visits to educational institutions, and associations with other members may create a desire to continue their formal education.

These, then, are the educational objectives measured in this study: (1) Knowledge of food preservation subject matter, (2) self-confidence in their ability to can fruits and vegetables, (3) desirable attitude toward the effect of eating fruits and vegetables on health, (4) desirable health practices as to the amount and variety of fruits and vegetables eaten, and (5) desire to continue their formal education longer.

CONDUCTING THE STUDY

Preparing the Questions

For each of these objectives test questions were prepared in cooperation with State and county 4-H Club agents, subject-matter specialists, and members of the Federal Extension staff. To obtain a cross-section sample of food-preservation information, the 4-H food-preservation program was examined and nine types of information were identified: (1) Getting equipment ready, (2) preparing the food, (3) blanching, (4) packing, (5) partly sealing, (6) processing, (7) completing seal, (8) properties of foods, and (9) storing. Test questions were prepared for each of these types and submitted to subject-matter specialists for comment and suggestions on the accuracy of subject matter and correctness of answers. These questions together with those prepared for the other objectives were set up in an eight-page booklet 1/ and multilithed.

Collecting the Data

The questions were given to members and nonmembers of the 4-H Club food-preservation project in Franklin, Hampden, and Hampshire Counties at the beginning of the project period in May 1939 and again at the end in October 1939. In this way growth in the five objectives during the project period was obtained for both members and nonmembers, and a comparison of the two groups on each objective was possible. Data were obtained on 183 present members who completed, 30 members who did not complete, and 216 girls who never had been members of a 4-H food-preservation club. The individuals were contacted at school through arrangements made with the school authorities, at 4-H Club meetings, and in home visits. None of the participants were informed that the questions would be asked a second time at the close of the project. No difficulty was encountered in enlisting the girls' cooperation in answering the questions.

THE RESULTS OF THE STUDY

General Information

The average age of the members was 11.8 years as of their last birthday; that of the nonmembers was 12.3 years. The nonmembers were one-half year older than the members. Both groups on the average were in about the same year in school. Both groups were making better than normal progress in school. The members were 0.5 years advanced in school and the nonmembers 0.1 years.

The members were participating in a 4-H food-preservation club on an average of 2.0 years, including the year in which the study was made. Forty-nine percent of the members participated for the first time in

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1/ See appendix.

1939; 25 percent were second-year members; and 26 percent were third-year members or longer. The nonmembers had never participated in a 4-H food-preservation club. All of the members of course, were in some 4-H Club work during the year of the study. They had been in 4-H Club work on an average of 2.1 years. Only 14.4 percent of the nonmembers of the food-preservation club were in 4-H Club work during the year of the study and they were in an average of 1.3 years.

Both groups were nearly equal in knowledge of food preservation at the beginning of the project. The members' index score was 30.9 and the nonmembers', 29.3 points. The members were more confident in their ability to preserve foods than the nonmembers. The members' index of confidence was 8.76 points and the nonmembers', 7.88 points.

Table 1. - General information concerning members and nonmembers

General information	Members	Nonmembers
Number of individuals	183	216
Average age (years)	11.8	12.3
Average grade in school	6.6	6.7
Average number of years accelerated in school	.5	.1
Average number of years in a 4-H food-preservation club	2.0	0.0
Average number of years in some 4-H Club	2.1	1.3
Percentage who were in some 4-H Club in 1939	100.0	14.4
Average beginning score on food preservation subject matter	30.9	29.3
Average beginning score on confidence	8.76	7.88
Average beginning score on food attitude	1.52	1.32
Average beginning score on food habits	3.38	3.20
Average beginning score on school plans	2.88	2.78
Percentage of girls who helped someone can	82	67
Median number of times girls helped someone can	4.6	2.9
Percentage of girls whose mothers canned	84	71

The members had a somewhat more favorable attitude toward the effect on health of eating fruits and vegetables. The members' index was 1.52 points and the nonmembers', 1.32 points. At the beginning of the project period in May the members reported eating more fruits and vegetables in their daily diets than the nonmembers did. The members' index was 3.38 and the nonmembers', 3.20.

Desire to continue in school was not a 4-H objective limited to members of a 4-H food-preservation club. It was considered as an objective of any 4-H Club and as a probable outcome of experiences in any 4-H Club. Hence, in comparing members and nonmembers on desire to continue in school, the member group consisted of members of any 4-H Club during the period, and the nonmember group consisted of individuals who were not in any 4-H Club during the period. The member group had a slightly greater desire to continue in school than the nonmember group. The average beginning index of the members was 2.88 points and that of the nonmembers was 2.78 points.

Eighty-two percent of the members and 67 percent of the non-members helped their mothers or someone can during the season. Half of the members helped at least 4.6 times and half of the nonmembers helped at least 2.9 times. Eighty-four percent of the members and 71 percent of the nonmembers were from families in which the mothers canned. Hence all the girls in food-preservation clubs and a large percentage of the girls who were not in food-preservation clubs had some experience in canning.

Control Factors

To compare the growth of members and nonmembers it was necessary to have the two groups equivalent. All the factors on which data were collected in the study were tested to determine which would be useful as controls to make the groups equivalent. The only factor found significant as a control was the score at the beginning of the project - the measurement of that objective when the project began.

Age, for example, was not a factor significantly related to growth in knowledge about food preservation. Younger girls made as much growth as older girls. Neither grade in school nor acceleration or retardation in school added anything to the control effect of the score at the beginning of the project. When the members and nonmembers were equated on their beginning score, adding any of the other factors did not increase the effectiveness of the control. The less the girls knew about food preservation subject matter at the beginning of the project period, the more they learned during the project period. This relationship is shown in the following table.

Table 2. - Relationship between average beginning score and average gain in each score grouping of food preservation subject-matter knowledge

Beginnin-score grouping	Number of members	Average	
		Beginning score	Gain during project
(1)	(2)	(3)	(4)
36 and above	62	46.2	5.4
25 to 35	61	29.8	13.5
24 and below	60	16.1	18.0

Hence, the member and nonmember groups were equated so that both had the same average beginning score in knowledge about food preservation, for comparing the gain in that objective during the project.

Growth in Food Preservation Information

The members made an average gain of 12.2 points in food-preservation information and the equivalent group of nonmembers, 4.0 points. The members gained about three times as much as the nonmembers. The average beginning index of both the member and equivalent nonmember groups was 30.9 points. At the end of the project period the average index of the member group was 43.1 points and that of the nonmember group, 34.9 points.

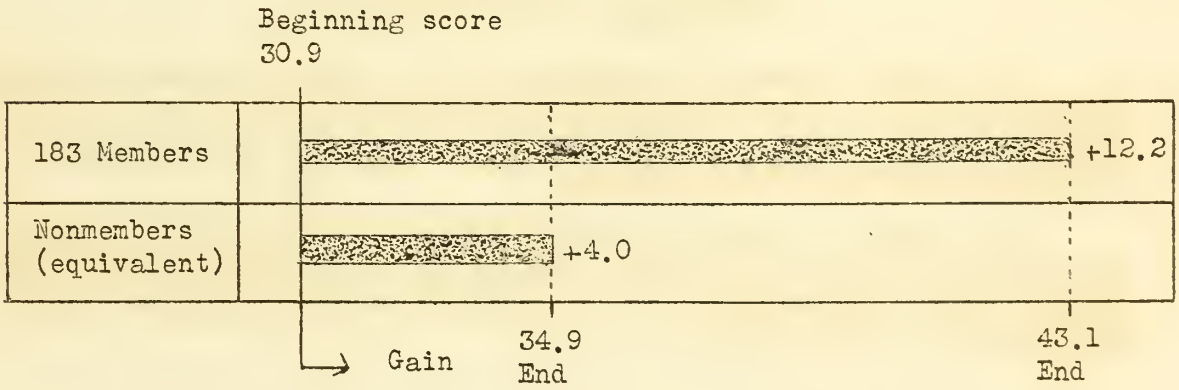

Figure 1. - Growth in food-preservation knowledge

The difference in gain between the members and nonmembers was 8.2 points. The standard error of this difference was 0.74 points; hence, the critical ratio was 11.1, showing that the difference was highly significant statistically.

Table 3. - Comparison of members and equivalent nonmembers in food-preservation information

Groups	Number	Average score		Average gain during project
		Beginning of project	End of project	
(1)	(2)	(3)	(4)	(5)
Members	183	30.9	43.1	12.2
Nonmembers	183	30.9	34.9	4.0
Difference in gains of the two groups				8.2
Standard error of the difference				.74
Critical ratio 1/ - statistical significance of the difference				11.1

1/ Critical ratios given below show the chances that the difference was too great to be attributed to random fluctuations in sampling:

Critical Ratio	Chances in 100
2.00	97.7
2.50	99.4
3.00	99.9

Development of Self-Confidence

The member group on the average made a large increase in confidence in their ability to can food products while the nonmembers lost confidence. The members made an average increase of 0.55 points and the nonmembers, an average decrease of 0.28 points.

The index of confidence at the beginning of the project period was 8.76 points for both groups. By the end of the project period the members' index had increased to 9.31 points and the nonmembers' index had dropped to 8.48 points.

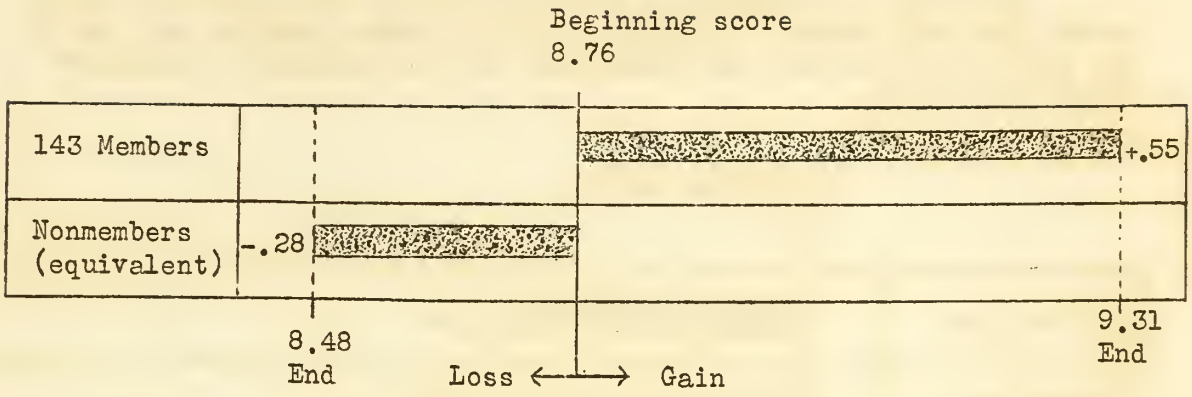

Figure 2. - Growth in self-confidence.

Table 4. - Comparison of members and equivalent nonmembers in confidence in their ability to can food products

Groups	Number	Average index		Average change during project
		Beginning of project	End of project	
(1)	(2)	(3)	(4)	(5)
Members	143	8.76	9.31	0.55
Nonmembers	143	8.76	8.48	- .28
Difference in change of the two groups				.83
Standard error of the difference				.10
Critical ratio - statistical significance of the difference				8.3

The difference in change in confidence was 0.83 points in favor of the members. The standard error of this difference was 0.10 points; hence, the critical ratio was 8.3, showing that the difference was highly significant statistically.

Change in Food Attitude

The members' and the equivalent nonmembers' attitude toward the effect on health of eating fruits and vegetables increased slightly in a favorable direction during the project period. However, there was practically no difference in the gain of the two groups. In fact, the nonmembers gained 0.01 points more than the members. The members gained 0.04 points and the nonmembers 0.05 points.

The index of attitude at the beginning of the period was 1.52 points for both groups. The index for the member group at the end of the project period was 1.56 points and for the equivalent nonmember group 1.57 points.

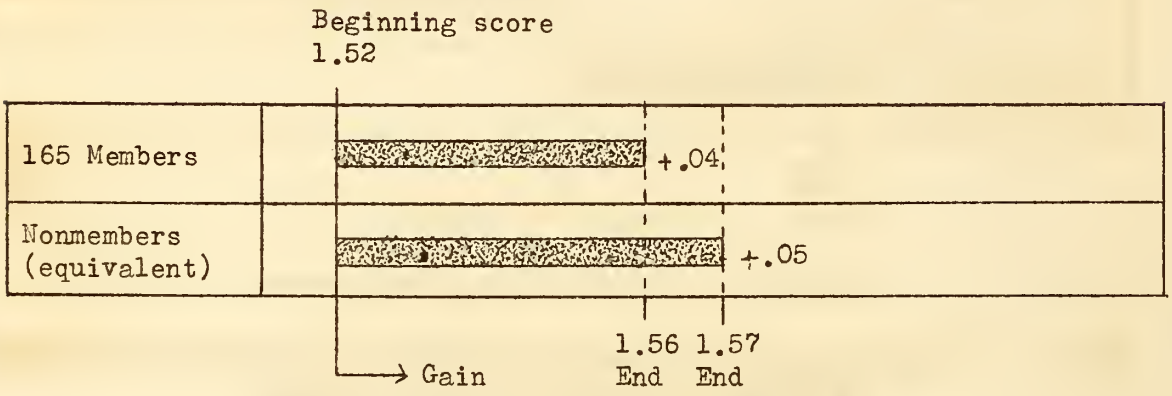

Figure 3. - Change in Food Attitude

Table 5. - Comparison of members and equivalent nonmembers in change in food attitude

Group	Number	Average index		Average change during project
		Beginning of project	End of project	
(1)	(2)	(3)	(4)	(5)
Members	165	1.52	1.56	0.04
Nonmembers	165	1.52	1.57	.05
Difference in change of the two groups				- .01
Standard error of the difference				.04
Critical ratio - statistical significance of the difference				.2

The standard error of this difference was 0.04 points; hence, the critical ratio was only 0.2, showing that the difference was not significant statistically. The difference could easily have been due to chance involved in sampling.

The same result was found in the next objective - food habits. No statistically significant difference was found between the two groups. These results seemed inconsistent with what might be expected, until the experiences provided the girls in the 4-H Club food-preservation program were checked. An examination of the food-preservation bulletin given each girl showed that there was nothing in it pointing out the

relationship between eating fruits and vegetables and their effect on health. The local leaders of the clubs did not give special attention to these objectives in the program. Hence, the members gained no more in these objectives than the nonmembers.

This was a significant finding. It showed that for an objective to function, experiences must be provided in the 4-H program to bring about growth in the objectives. Methods for providing these experiences were discussed. The 4-H Club food-preservation bulletins could be revised to add material emphasizing the importance of fruits and vegetables in the diet, that they contain vitamins, the need of a proper distribution of vitamins in maintaining health, and the poor health conditions which may develop from lack of necessary foods. A special bulletin could be prepared for 4-H members on the relationship of food and health. The question and materials could be discussed at local leader training meetings. The results of the study could be presented in charts to the local leaders. Developing good food attitudes and habits are particularly appropriate objectives of 4-H food-preservation clubs.

Change in Food Habits

Both the members and nonmembers ate more fruits and vegetables daily at the end of the project period than they did at the beginning. However, as was found in food attitude, the nonmembers' gain was slightly greater than the members'. The members gained 0.11 points and the nonmembers, 0.17 points.

The index of the member group and the equivalent group of nonmembers was 3.38 points at the beginning of the project period. By the end of the period the members' index had increased to 3.49 and the nonmembers' to 3.55.

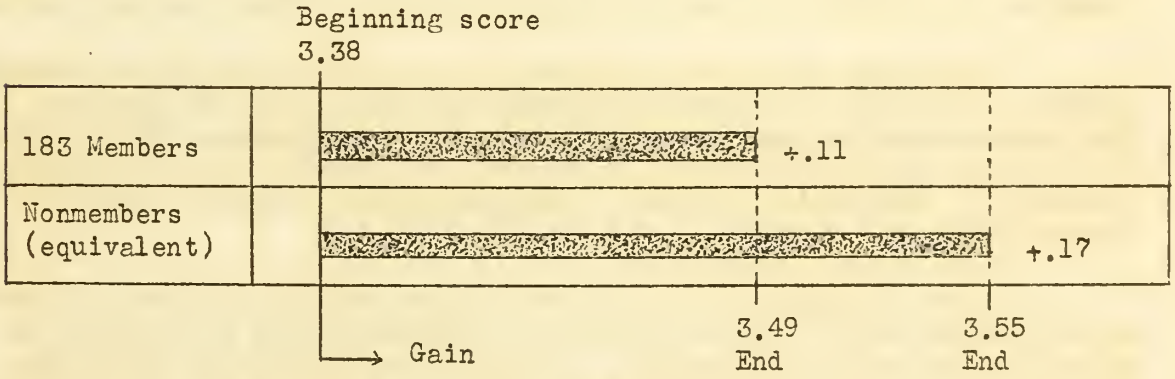

Figure 4. - Change in food habits

Table 6. - Comparison of members and equivalent nonmembers in change in food habits

Groups	Number	Average index		Average change during project
		Beginning of project	End of project	
(1)	(2)	(3)	(4)	(5)
Member	183	3.38	3.49	0.11
Nonmembers	183	3.38	3.55	.17
Difference in change of the two groups				- .06
Standard error of the difference				.09
Critical ratio - statistical significance of the difference				.7

The difference in change of 0.06 points was in favor of the nonmember group. The standard error of the difference was 0.09 points; hence, the critical ratio was 0.7, showing that the difference was not statistically significant. The difference could easily have been due to chance involved in sampling.

Change in Desire To Continue in School

Desire to continue in school as an outcome of the 4-H Club work is not necessarily limited to the food-preservation project. It is general to 4-H Club work. Hence, the comparison of members and nonmembers was made of the girls who were in any 4-H Club during the period of the study and the girls who were not in any 4-H Club during the same period.

Since older girls did not plan to go as far in school as younger girls, a decrease in desire to continue in school would be expected. The results for the nonmembers followed this expectation. They decreased 0.14 points during the period of the study in their desire to continue in school. The members, however, remained about the same. They decreased only 0.01 points.

At the beginning of the project period in May the index of desire of the member group and the equivalent nonmember group to continue in school was shown by 2.88 points. By the end of the period in October the members' index had dropped 0.01 points to 2.87 and the nonmembers' index had dropped 0.14 points to 2.74.

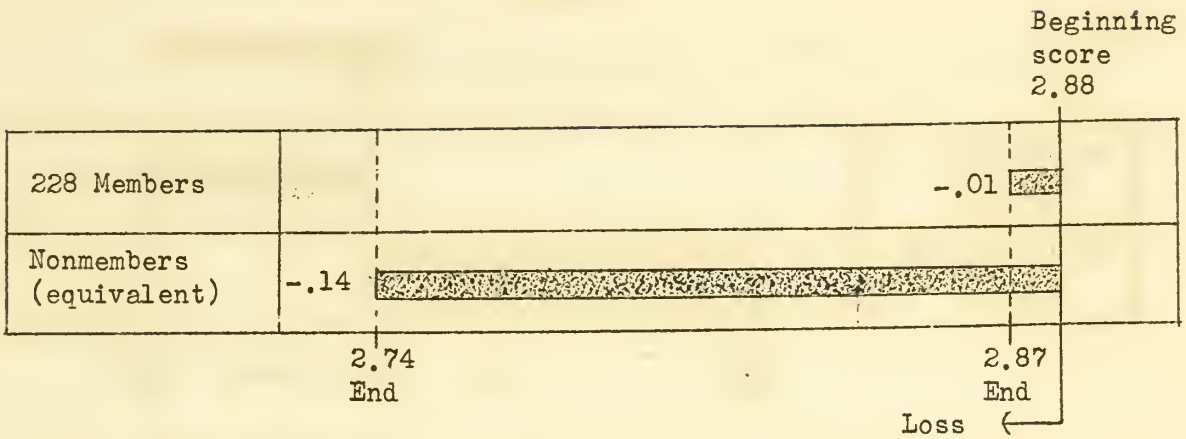

Figure 5. - Change in desire to continue in school

Table 7. - Comparison of members and equivalent nonmembers in change in desire to continue in school

Groups	Number	Average Index		Average change during project
		Beginning of project	End of project	
(1)	(2)	(3)	(4)	(5)
Members	228	2.88	2.87	-.01
Nonmembers	228	2.88	2.74	-.14
Difference in change of the two groups				.13
Standard error of the difference				.05
Critical ratio - statistical significance of the difference				2.6

The difference in decrease was 0.13 points. The standard error of this difference was 0.05 points; hence, the critical ratio was 2.6, showing that difference was reasonably significant statistically.

Sidelights of the Study

Members who completed their project work gained self-confidence: those who were incomplete lost self-confidence. - The group of members who did not complete their project was equated with the members who completed so that both groups had the same average beginning index of confidence and were in a food preservation club the same number of years. The group of members who completed was in a 4-H food preservation club 1.4 years, had an average beginning confidence index of 8.38 points, and gained 0.47 points. The equivalent group of incomplete members was also in a 4-H food preservation club 1.4 years and had an average beginning

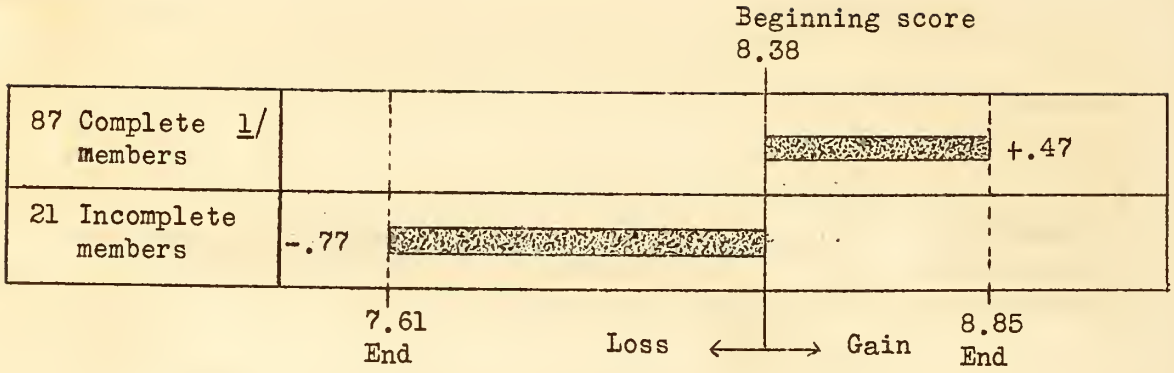

Figure 6. - Comparison of complete and incomplete members in development of self-confidence

1/ In figures 6, 7, 8, and 9 the number of complete members or incomplete members was less than the total number of records in the study because of loss in matching the groups on the beginning score and number of years in a food-preservation club.

confidence index of 8.38 points, but they lost 0.77 points in confidence. These results agreed with those found in the evaluation study in the vegetable garden clubs.2/

Members who completed their project work gained more food preservation knowledge than the incomplete members. - The group of members who did not complete their project was equated with the members who did complete so that both groups had the same average beginning score in food preservation knowledge and were in a food preservation club the same number of years.

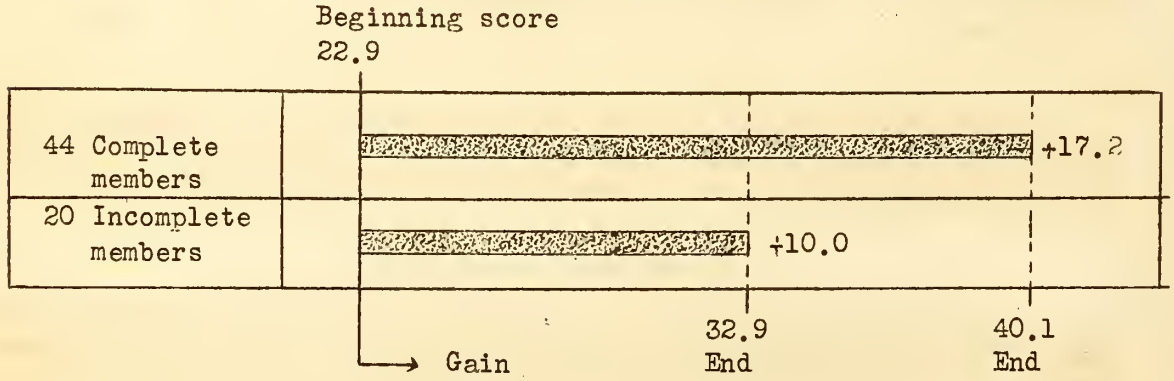

Figure 7. - Comparison of complete and incomplete members in growth in food preservation knowledge

2/ Frutchey, Fred P.; Nodine, Earle H.; and Erickson, George E. Evaluation in the 4-H Vegetable Garden Project, Massachusetts 1939. U. S. Dept. Agr. Ext. Serv. Cir. 353. 22 pp. Washington, D. C. 1941.

The group of members who completed were in a 4-H food preservation club 1.3 years, had an average beginning score of 22.9 points, and gained 17.2 points. The equivalent group of incomplete members was also in a 4-H food preservation club 1.3 years and had an average beginning score of 22.9 points. They also gained during the period of the project. However, their gain of 10.0 points was less than that of the members who completed.

Although the results of the study do not establish a cause and effect relationship, as was pointed out in the vegetable garden study,[3/] they raise a caution signal as to the effects on the personality development of the girls who do not complete. If a girl fails to complete, care should be taken that the girl does not get a sense of failure.

Members' knowledge of food preservation increased with their experience in canning. - Learning by doing is a fundamental principle of 4-H Club work. Members who canned the greatest number of jars of food products learned more food-preservation information than those who canned the smallest number of jars. Members who canned 65 jars or more in their project, members who canned 30 to 64 jars, and members who canned 29 jars or less were equated so that the three groups were in a food-preservation club the same number of years, 1.4 years, and had the same beginning score of 29.5 points in food-preservation knowledge. The members who canned 65 jars or more gained 23.4 points; those who canned 30 to 64 jars gained 12.5 points; those who canned 29 jars or less gained only 5.3 points.

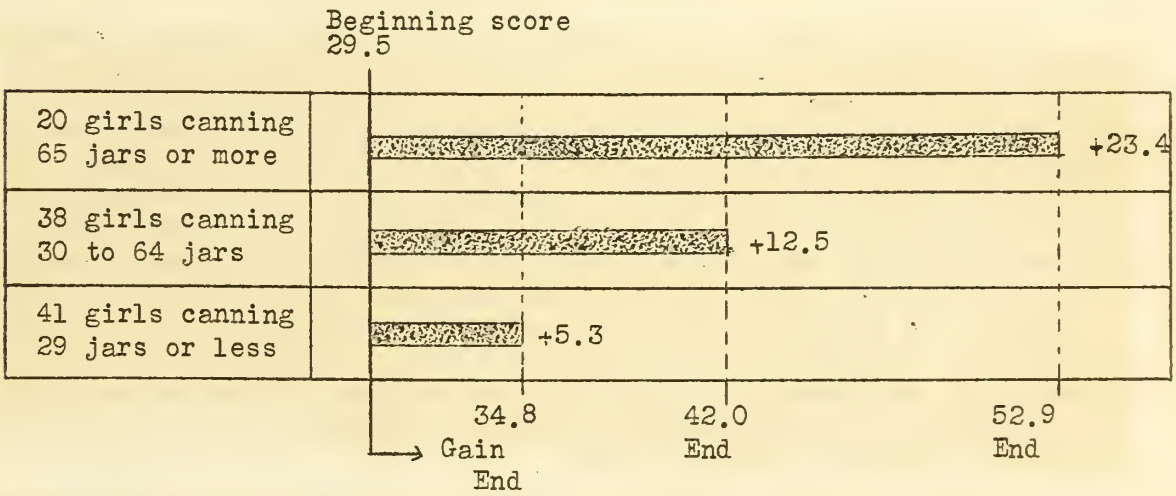

Figure 8. - Relationship between amount of canning done by members and growth in food preservation knowledge

Members developed self-confidence as their experience in canning increased. - The members who canned the greatest number of jars of food products developed more confidence in their ability to can than those

3/ See footnote 2, p. 16.

who canned the smallest number of jars. Members who canned 65 jars or more in their project, members who canned 30 to 64 jars, and members who canned 29 jars or less were equated so that the three groups were in a food-preservation club the same number of years, 1.6 years, and had the same beginning index of confidence in their ability to can (8.52 points). The members who canned 65 jars or more gained 0.71 points; those who canned 30 to 64 jars gained 0.53 points; those who canned 29 jars or less gained 0.32 points.

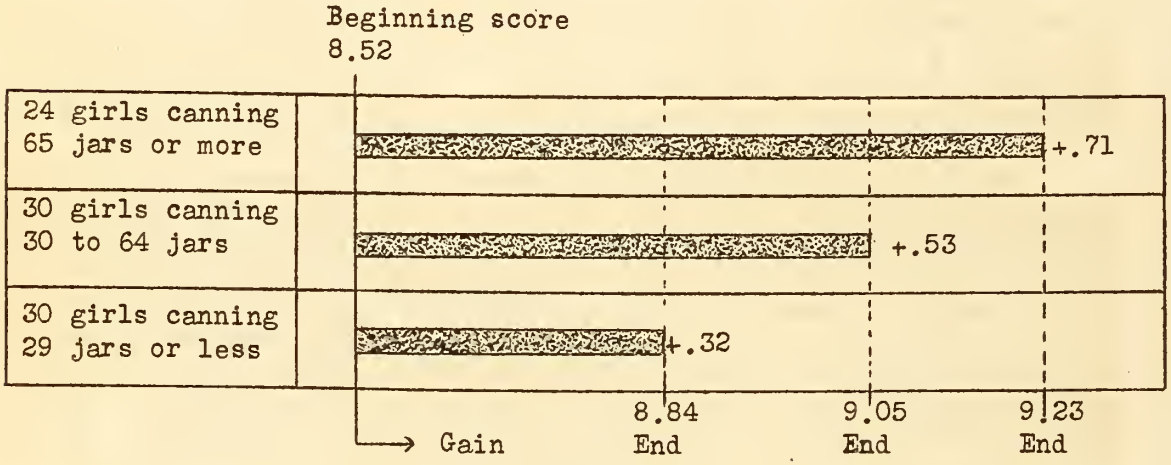

Figure 9. - Relationship between amount of canning done by members and development of self-confidence

These data show that the more the girls canned the more food-preservation knowledge they learned and the more confident they became in their ability to can. These girls were members who completed their project work. From these results it does not necessarily follow that higher standards of completion should be set. It was also found that the members who did not complete lost self-confidence in contrast to those who completed, although they did learn about food preservation but not as much as the members who completed. Raising standards of completion may result in more incompletions, and more incompletions may result in greater ill effects upon the personality development of the girls. Concern for the growth and development of the individual girl should be given first consideration. Quantitative material standards should receive secondary consideration and should be adapted to the first and most important concern of 4-H Club work.

Analysis of the questions in each of the eight types of food-preservation information. - At the beginning of the project period the members knew most about preparing the food for canning and made some gain in this type of information. They knew about one-third of the information about blanching and their gain was 40 percent of the total possible score. The large gain in "blanching" resulted from learning that it was advisable to blanch certain foods rather than to peel them.

Table 8. - Comparison of various types of food-preservation information known and gain made by members

Type of food-preservation information	Percentage of total possible score	
	Beginning of project	Gain during project
(1)	(2)	(3)
Preparation of food	51.5	9.5
Packing	47.9	5.3
Getting equipment ready	47.4	13.4
Processing	35.8	17.6
Partly sealing	35.2	15.6
Blanching	33.5	40.0
Properties of foods	28.2	14.2
Completing seal	16.7	17.2

The low beginning index on information about " completing the seal" resulted largely from many of the girls thinking that after processing the jars should be cooled before the side clamp is pushed down. The gain was largely due to correction of this misconception. Most of the girls thought the clamp pressed the lid on the rubber of the jar and thereby sealed the jar. They did not realize that the clamp merely kept the lid from being bumped off. Many of them still had this misconception at the end of the project. A simple demonstration to show that this misconception is not true consists of removing the clamp of a completely sealed jar of food and turning the jar upside down. With a properly sealed jar the lid will remain intact on the jar and will not fall off.

The gain in "processing" resulted principally from learning three things. They learned that the processing time should be counted from the time the water begins to boil after the jars are put in and not from the time the jars are put in. The girls learned that if the processing period is made longer than necessary the food may not look as nice. They learned that foods containing acids such as tomatoes require a shorter processing period than nonacid foods.

The members contributed to the family winter food supply. - The average girl canned 58.0 jars of food products in her 4-H Club work. This included 35.4 jars of vegetables, 14.0 jars of fruits, and 8.6 jars of jelly or jam. Girls who were in a 4-H Food preservation club for 2 years or more canned 82.4 jars on the average, which included 46.7 jars of vegetables, 20.5 jars of fruits, and 15.2 jars of jelly or jam.

All members (168)	Jars per member
Vegetables	35.4
Fruits	14.0
Jelly or jam	8.6
Total	58.0

First-year members (82)	
Vegetables	23.6
Fruits	7.3
Jelly or jam	1.8
Total	32.7

Members for two years or more (86)	
Vegetables	46.7
Fruits	20.5
Jelly or jam	15.2
Total	82.4

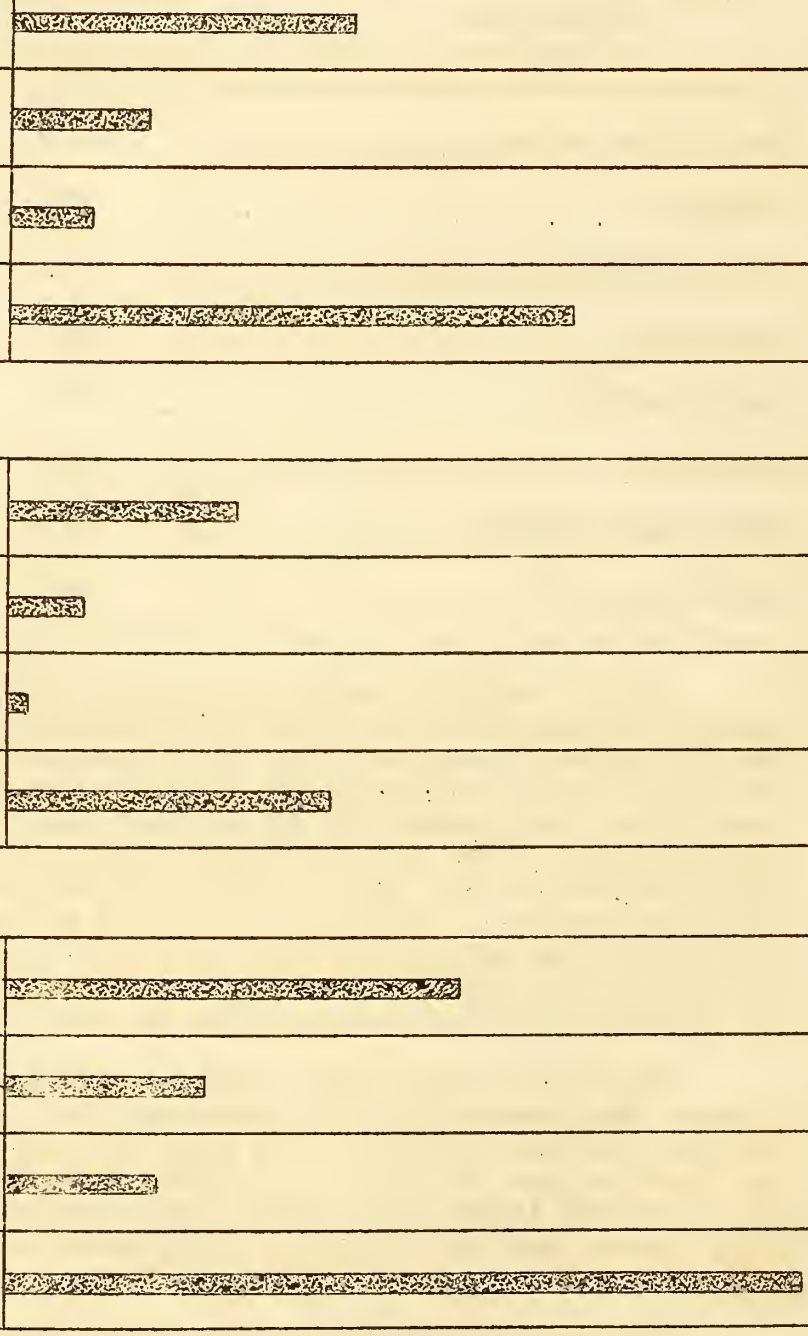

Figure 10. - Number of jars of food products canned per member

Girls who were members for the first time during the summer of the study canned only 32.7 jars on the average, which included 23.6 jars of vegetables, 7.3 jars of fruits, and 1.8 jars of jelly or jam.

Fifteen percent of the girls canned over 100 jars of food products. One girl canned 385 jars.

The members contributed to family living by helping their mothers with canning. - Besides doing the canning for their 4-H Club project, the girls helped their mothers or someone else with canning. They were asked the following question.

"Did your mother do any canning this year?"

84 percent - Yes

16 percent - No

They were then asked -

"Did you help your mother or anyone else with their canning this year? How often?"

( )None; ( )Once; ( )Twice; ( )Three times; ( )Four times; ( )Five times or more.

The following table shows the replies for those girls whose mothers canned and for those girls whose mothers did not can.

Table 9. - Comparison of canning experience of members whose mothers canned and members whose mothers did not can

Number of times girls helped their mothers or someone else with their canning.	Percentage of girls who helped their mothers or someone else with their canning	
	Girls whose mothers canned	Girls whose mothers did not can
(1)	(2)	(3)
Five times or more	42	11
Four times	12	4
Three times	12	0
Two times	14	11
Once	10	15
Did not help	10	59

The girls whose mothers canned helped others more often than the girls whose mothers did not can.

Eighty-four percent of the girls' mothers canned food products for home use. Ninety percent of these girls helped their mothers or someone else with canning. At least half of the girls helped 4.7 times

Table 10. - Comparison of canning experience of members whose mothers canned and members whose mothers did not can

Girls who helped their mothers or someone else with their canning	Girls whose mothers canned	Girls whose mothers did not can
(1)	(2)	(3)
Percentage of girls	90	41
Median number of times helped others with canning	4.7	2.3

during the summer. Sixteen percent of the girls' mothers did not do any canning and 41 percent of these girls helped someone with canning. At least half of the girls helped 2.3 times, however.

The members appreciated their canning work. - Three evidences of appreciation were obtained in the study. These were (1) wanted more experience in a 4-H food preservation club, (2) wanted to recommend it to other girls of their same age, and (3) thought the experience was worth much to them.

The members were asked: "Do you want to be a 4-H canning club member next year?" The members answered as follows:

90 percent - Yes

3 percent - No

7 percent - Uncertain

The members were also asked the question: "Do you feel that you got so much out of your 4-H canning work this year that you want to recommend it to other girls of your age?" Answers received were:

87 percent - Yes

7 percent - No

6 percent - Uncertain

When they were asked, "Has your 4-H canning club work this year been worth much to you?" the members responded as follows:

71 percent - Very much

18 percent - Much

9 percent - Some

1 percent - Very little

1 percent - Worth nothing

They thought their 4-H canning club work was worth while because of personal values obtained and because of contributions to their families. These values and the percent of members indicating each value are given in table 11.

Table 11. - Values of the 4-H food preservation club work

Values	Percentage of members indicating each value
(1)	(2)
Learned to help their mother with her canning	73
Actually canned and learned how	66
Obtained a lot of fun and satisfaction from the work	64
Furnished good food for the health of their family	58
Knowledge gained about canning	55
Money saved for their families	48

The value of their 4-H Club experience was not perfectly satisfactory, however. The members identified things which detracted from the worthwhileness of the work. These reasons and the percentage of members indicating each are given in table 12.

Table 12. - Dissatisfactions members felt with their 4-H canning work

Their 4-H canning club work would have been worth more - (1)	Percentage of members indicating each (2)
If they had more time to can	22
If they did not have to buy their food products to can	8
If the food they canned did not spoil	7
If they liked the canning work more	5
If their parents wanted them to can	2
If canning work were not so much trouble	1

FOOD PRESERVATION

Name_____; Date_____

( )Boy; ( )Girl. Age at next birthday_____years

School you attend_____; Grade you are in_____

Town_____; County_____

Part 1.

Check each of the answers that are true. One or more than one answer may be true as in the following example:

Example:

The ideal storage space is -

( )a. cool and moist.

( )b. cool and dry.

( )c. hot and moist.

( )d. a place where the temperature range is about 40 to 50 degrees.

( )e. a place where the temperature range is about 20 to 80 degrees.

DO NOT GUESS

1. For the best canning results the products -

( )a. must be fresh.

( )b. may be old.

( )c. It makes no difference.

2. What are the first two things you should do in starting to can tomatoes?

( )a. Prepare the tomatoes to be canned.

( )b. Examine jars and equipment.

( )c. Get water bath heating.

( )d. Cook the tomatoes.

Based on subject matter in Massachusetts Extension Leaflet No. 142 and Junior Extension Leaflets Nos. 27 and 29.

Extension Services of the United States Department of Agriculture and the Massachusetts State College cooperating, 1939.

982-39

3. Partly sealing of wire clamp type jar includes -

( )a. putting on the rubber.

( )b. putting on the cover.

( )c. snapping the top clamp into the notch on the cover of the jar.

( )d. snapping the side clamp down.

4. What causes canned foods to spoil?

( )a. Not processed long enough.

( )b. Shaking the jars.

5. Begin to count the processing time -

( )a. from the time the jars are put into the boiling water.

( )b. from the time the water begins to boil after the jars are put in.

6. Why is food processed in canning? Check the most important <u>one</u>.

( )a. So that the food does not need to be cooked when the cans or jars are opened later.

( )b. To soften the food so that you can get more in the jar.

( )c. To kill tiny living things (bacteria) which might spoil the food.

( )d. To expel the air.

7. After the processing the jars should be taken out of the water bath and -

( )a. cooled before side clamp is pushed down.

( )b. the side clamp should be put down before they have cooled.

8. The clamp on the lid of the jar -

( )a. presses the lid on the rubber and thereby seals the jar.

( )b. does not seal the jar but only keeps the lid from being bumped off.

9. If the processing is done in a little less time than the recipe says -

( )a. the food might spoil.

( )b. the food will keep just as long.

( )c. the food will taste better.

10. If the processing is done extra long -

( )a. the food might spoil.

( )b. the food might keep longer.

( )c. the food might not look as nice.

Part 2.

11. Check the three fruits that contain the most amount of pectin.

( )a. Apples.
( )b. Cherries.
( )c. Grapes.
( )d. Pears.
( )e. Peaches.
( )f. Plums.
( )g. Raspberries.

12. Check these foods that are acid foods.

( )a. Apricots.
( )b. Asparagus.
( )c. Cherries.
( )d. Corn.
( )e. Lima beans.
( )f. Pears.
( )g. Tomatoes.

13. Jelly can be made from all fruits -

( )a. that contain enough pectin and acid.

( )b. because all fruits contain enough pectin and acid.

14. One is likely to get better quality if the jelly is cooked -

( )a. on a sunshiny day.

( )b. on a rainy day.

( )c. There is no difference.

15. Margaret has decided to can some corn. Check these things you would advise her to do.

( )a. Use pint jars.

( )b. Leave about ½-inch headspace in top of jar.

( )c. Fill the jar full.

( )d. Cut off a small amount of corn at one time.

16. Canning sirups containing too much sugar -

( )a. shrink the fruit.

( )b. bring out the fruit flavor.

( )c. spoil the fruit flavor.

17. If a friend of yours asked you how to make peach jam would you advise her to -

( )a. blanch the peaches?

( )b. peel the peaches with a knife without blanching?

( )c. cut the peaches into quite small pieces?

( )d. leave the peaches whole?

( )e. prepare the peaches just before the jam is to be made?

( )f. prepare the peaches the day before, sugar them, and let stand overnight?

18. Grace is going to can some tomatoes. Would you advise her to -

( )a. peel the tomatoes with a knife before canning?

( )b. blanch the tomatoes?

( )c. use ripe tomatoes?

( )d. use underripe tomatoes?

( )e. cut out the hard part around the stem end?

19. Foods containing acids such as tomatoes require -

( )a. a longer processing period than nonacid foods.

( )b. a shorter processing period than nonacid foods.

( )c. There is no difference.

Part 3.

20. Below is a short story about how Mary canned a vegetable mixture - two or more vegetables canned together. Mary tried hard to do a good job of her canning, but unfortunately she made some mistakes. Can you find her mistakes? Read the story and then check the mistakes Mary made. Check only her mistakes.

How Mary Canned a Vegetable Mixture

Mary decided to can a vegetable mixture for winter use by the family. Her mother agreed and said she could use the kitchen. After Mary arranged a neat working space in the kitchen, she obtained some carrots, peas, beans, and turnips from the garden. She cleaned the vegetables thoroughly and prepared them for canning.

The prepared vegetables were left in the kitchen while Mary went down to the cellar to hunt for jars. She found six clamp-type quart jars, brought them up to the kitchen and cleaned them thoroughly.

Check her mistakes - only her mistakes.

( )a. She prepared the vegetables before she cleaned the jars.

( )b. She did not put any lima beans and corn in the mixture.

( )c. She did not use fresh vegetables.

Then Mary started to get the water bath ready. While the water bath was heating she swept the kitchen and put things in order. When the water in the water bath was boiling, she packed the vegetables in the jars, being careful not to fill the jars full. She added some salt to each jar and just enough water to cover the vegetables completely, but she was careful to leave about ½-inch headspace in each jar. The lid was placed on each jar and partly sealed.

Check her mistakes - only her mistakes.

( )d. She prepared the vegetables before she prepared the water bath.

( )e. She used the jars without testing the clamps on the jars.

( )f. She used the jars without examining each one carefully.

( )g. She packed the vegetables without cleaning them thoroughly.

( )h. She did not boil the jars to sterilize them before packing.

( )i. She swept the kitchen at the wrong time.

( )j. She packed the jars after the water bath began to boil.

By this time the water bath had cooled sufficiently so that she could put the jars in the water without danger of cracking them. She immediately began to count the time necessary for processing. At the end of exactly 160 minutes she carefully took the jars from the water bath.

When the jars had cooled she snapped down the side clamp and took care that the jars were sealed tightly. Then she took them into the cellar where she stored them in a cool place. Mary felt quite happy about her work for the day.

Check her mistakes - only her mistakes.

( )k. She began to count the processing time before the water began to boil.

( )l. She processed the vegetables longer than necessary.

( )m. She sealed the jars after they had cooled.

( )n. She stored the jars in a cool place.

Part 4.

21. Suppose your mother asked you to can some tomatoes, string beans, and chicken, and to make some jelly. How would you feel about your ability to do those things?

Read the three sentences below, and check the one sentence which best tells how you feel about your ability to can each of the following - tomatoes, string beans, and chicken, and to make jelly.

	Tomatoes	String beans	Chicken	Jelly
a. I don't know how well I can do it and am a little afraid to try	( )	( )	( )	( )
b. I don't know how well I can do it but am willing to try	( )	( )	( )	( )
c. I think I can do it fairly well	( )	( )	( )	( )

Part 5.

22. How long do you plan to go to school? Check one.

( )a. I want to go 2 years to high school.

( )b. I want to finish high school.

( )c. I want to go 2 years to college.

( )d. I want to finish college.

23. What other education plans do you have?_____

_____

Part 6

24. What do you usually eat every day or nearly every day?

Check the things you usually eat every day or nearly every day.

( )a. I usually eat some potatoes.

( )b. I usually eat some one of the following, oranges or grapefruit or tomatoes or raw cabbage.

( )c. I usually eat at least one yellow or green-colored vegetable such as peas, beans, squash, carrots, etc.

( )d. I also usually eat two other vegetables, or some other fruit and one other vegetable.

25. Do you believe that eating fruits and vegetables daily helps to keep a person healthy?

( )Decidedly Yes; ( )Yes; ( )Don't know; ( )No; ( )Decidedly No.

Part 7.

26. Were you a member of a 4-H canning club this year? ( )Yes; ( )No.

27. How many years were you a member of a 4-H canning club (include this year if you are a member of a 4-H canning club this year)? _____years.

28. Were you a member of any 4-H Club this year? ( )Yes; ( )No.

29. How many years were you a member of any 4-H Club (include this year if you are a member of any 4-H Club this year)? _____years.

Part 8.

Below are some questions about your 4-H canning club work. Answer them as you really and truly believe. Be honest and sincere.

30. Do you want to be a 4-H canning club member next year?

( )Decidedly Yes; ( )Yes; ( )Hard to decide; ( )No; ( )Decidedly No.

31. Do you feel that you got so much out of your canning work this year that you want to recommend it to other girls of your age?

( )Decidedly Yes; ( )Yes; ( )Hard to decide; ( )No; ( )Decidedly No.

32. Has your 4-H canning club work this year been worth much to you?

( )Very much; ( )Much; ( )Some; ( )Very little; ( )Worth nothing.

If your 4-H canning club work this year has been worth while, check (✓) the reasons which tell why it has been worth while.

33. My 4-H canning club work has been worth while this year -

( )a. because of the money it has saved for our family.

( )b. because it has furnished good food for the health of our family this year.

( )c. because I got a lot of fun and satisfaction from the work.

( )d. because of the knowledge I gained about canning.

( )e. because I actually canned and learned how.

( )f. because I have learned to help my mother with her canning.

( )g. Other reasons_____

If your 4-H canning club work this year has not been worth so much, check (✓) the reasons which tell why.

34. My 4-H canning club work would have been worth more -

( )a. if I liked the canning work more.

( )b. if the food I canned did not spoil.

( )c. if I did not have to buy my products to can.

( )d. if I had more time to can.

( )e. if my parents wanted me to can.

( )f. if canning were not so much trouble.

( )g. Other reasons_____

35. Did your mother do any canning this year? ( )Yes; ( )No.

36. Did you help your mother or anyone else with her canning this year? How often?

( )None; ( )Once; ( )Twice; ( )Three times; ( )Four times;

( )Five times or more.

37. How many jars of vegetables did you can in your project this year?

_____jars.

38. How many jars of fruit did you can in your project this year?

_____jars.

39. How many jars of jelly or jam did you can in your project this year?

_____jars.